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A VISUAL FORM OF THE VERBAL SUMMATOR

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A VISUAL FORM OF THE VERBAL SUMMATOR*

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A visual form of the verbal summator has been developed as a supplement to the auditory form. The general method is designed to obtain verbal responses in the absence of the environmental stimuli which ordinarily influence the stream of speech. These responses are especially useful in the study of the conditions of latent speech and the factors influencing the emission of words, and as clinical material. In the auditory verbal summator (1), the imitative response to an auditory skeletal vowel pattern summates with a relatively strong latent response to produce overt verbal behavior. In the present experiment, an attempt was made to evoke latent responses through summation with incipient responses to skeletal visual speech patterns. The phenomena involved are not peculiar to the experimental situation. The significance of misreading in everyday life, for example, has been discussed by Freud (4).

SUBJECTS AND TECHNIQUE

In changing from the auditory to the visual field, the chief experimental problem was that of finding stimuli which would lead to the emission of verbal responses, but which nevertheless would not have a differential effect upon any particular set of words. The stimuli which have proved most satisfactory are small cards upon which words, phrases or sentences are printed. The rather specific strengthening of a particular response by the appropriate stimulus which ordinarily occurs in reading was avoided by adjusting the distance of the stimulus card from the subject so that he could make out something of the general outline of the words but could not read the words or make out individual letters. This distance was determined for each subject before beginning an experiment. The cards were exposed in a Whipple disc tachistoscope with an exposure time of 1/10 sec. In an earlier experiment, the subject was permitted to look at the card as long as necessary before responding, but the method of repeated short exposures of the

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stimulus has proved more satisfactory. The suggestion that the response emitted corresponds to the phrase on the stimulus card is easier to maintain when the card is shown briefly and replaced by a black post-exposure field before the verbalization is completed. The instructions to the subject, designed to produce a suitable attitude toward the experiment, run as follows:

DIRECTIONS TO THE SUBJECT

"This is a study of factors involved in reading. Words and word-groups will be exposed for short intervals in the apparatus before you. The time of exposure and the distance of the stimulus cards from your eyes are such that you will be able to see only general outlines of the words—not individual letters. However, if you follow instructions carefully, you will be able to identify the words without difficulty. Experiments have shown that you do not actually need to see the individual letters of words in reading; certain general characteristics are enough to suggest words to you. Do not strain your eyes to make out the details of these samples. Look at the fixation point, and when the card is exposed, respond just as you would in reading aloud. Look at the card and respond immediately with whatever phrase is suggested to you. The only difference from ordinary reading is that cues from individual letters are eliminated; general outlines of words will suggest the correct responses to you.

"Remember, look at each sample when it is shown, and as soon as anything with meaning flashes through your mind, report it *at once*. It is most important that you report the *first* word or word-group that comes to you. What you get wrong or incomplete is as much a part of this experiment as what you get right."

These instructions, handed to the subject on a typewritten sheet, proved effective for the group of sophomore college students on which the technique was standardized; but they would, of course, require modification for subjects who differed greatly in age, intelligence, or educational background.

Opportunity for irrelevant associations which would interfere with the emission of responses according to their own latent strengths was eliminated so far as possible. The experimental room was bare, except for the necessary apparatus, and dimly illumi-

nated, a single light being focussed by reflectors upon the surface of the tachistoscope. The subject was told to report aloud immediately after the card was exposed in each case, and if he could not respond, the exposure was repeated as many times as necessary, without appreciable intervals between exposures, until a response was forthcoming. As soon as the subject responded, he was told to write his response down on the exposed line on his answer sheet (previous answers were kept covered); while he did so, a new stimulus card was inserted in the apparatus, and the ready signal for a new exposure was given as soon as the subject had finished writing. Since there proved to be virtually no relationship between the subjects' responses and the words printed on the stimulus cards, the particular stimuli used in this experiment need not be listed. Two sets of cards were used; the first series consisted of 36 cards containing from one to four words each, the second series of 60 cards containing from five to eight words each.

With the technique described, satisfactory results have been obtained from students in a sophomore psychology laboratory class, and (with modified instructions) from younger children. The only difficulty usually encountered is that of getting the first response or two from a subject. But if told that their replies are satisfactory, the majority of subjects soon come to respond to one, or only a few, repetitions of each stimulus card. In data collected so far, approximately 65% of the responses were made to the first showing of the stimulus, 21% to one repetition, and only 4% required more than five repetitions.

THE EXPERIMENTAL DATA

After verbal responses have been obtained in this situation, with the usually appropriate external stimuli nearly eliminated, it is desirable to show the presence of some of the properties of normal speech by quantitative treatment of the data. Since the usefulness of the responses obtained depends upon the assumption that certain of the processes responsible for normal speech, especially the latent strengths of responses and their interrelationships in the verbal "reserve" of the individual, will operate to determine the particular words produced by summation, it is necessary to demonstrate that these words cannot be accounted for merely by "chance"

THE RESEMBLANCE BETWEEN STANDARD AND
SUMMATED SPEECH WITH RESPECT TO THE
DISTRIBUTION OF WORD-PERCENTAGES

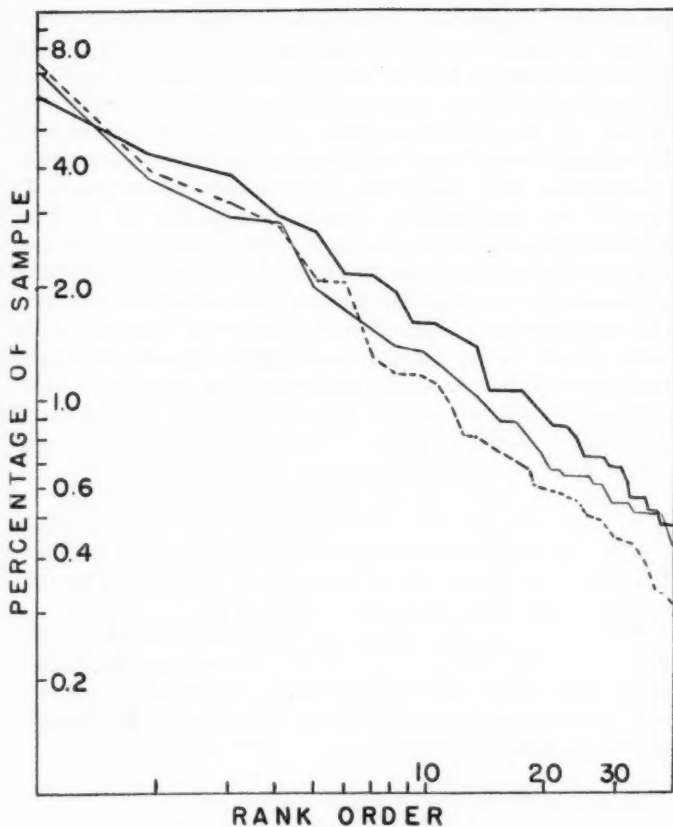


FIGURE 1

The heavy line represents the data obtained with the visual summator; the lighter line, data obtained by Skinner with the verbal summator; the broken line, Dewey's standard English.

or "random" factors. A block of responses amounting to approximately 1920 words, including all data collected from the first eight subjects tested with the above-described procedure, will be used for purposes of comparison with a quantitative property of normal speech. The subjects were all sophomore college students.

One uniformity found in normal speech is the relation between the percentage of the bulk of a sample contributed by a word and the rank order of the word in frequency. The data given by Fletcher (2) for Dewey's standard American English show that this relation, when plotted for all words in a sample, gives a close approximation to a straight line curve on logarithmic paper. In Figure 1, the distribution of word-percentages for the block of responses obtained with the visual summator has been plotted along with the distributions found by Dewey for standard English and by Skinner (1) for responses obtained with the verbal summator. The approximation of the curves for summated responses to the linear relation found for standard English appears remarkably good, especially in view of the smallness of the samples. This resemblance is evidence for the argument that the relation found by statistical studies of speech is descriptive of the condition of relative strengths of latent responses in the individual.

Considerable agreement is found between frequency lists for words obtained by summator methods and Dewey's list for standard English. 31 of the 40 most frequent words in the visual summator data and 35 of the 40 most frequent words in Skinner's data appear among the first 100 words on Dewey's list.

The type of responses obtained by the visual summator will be illustrated by the following records for two subjects, both female college sophomores. For the first subject, the responses are given as a sample protocol; for the second, the responses are classified into rough thematic groups.

Sample protocol:

left with me; his wife; tell me of; hit by the arm; guilty of the crime; to take this arm; light my way; boot planned; about my arm; get through the arm; feel the toe; tight on the arm; tied on the arm; on the side; letter by the hand; it on my head; real as they did; is statue on my left; graft on the side; found on its head; quarrel with; little girl all well; run down the hill;

great man in the well; this brush on my head; toy on the; story down the hill; this way Marian went; it's become well; it was little then; jumped on the hill; it will be there; adorned a pair; strict; day at the fair; at a first hour when; Harriet on the hill; treats good on the way; length mile of the; the title place; hit on the plate; buried to the left; at this termed like; they do appeal to all; gift in the hand; wall with; hit upon the wall; a mirror of eyes; a very good time; glitter on the face; affects; at number all; under typing; rigid; a rigid friend; no; a rigid friend; in vain it's gone; vanities; villain at; in the glass; it was all; vain it goes to; martyr; villain; the day is gone; daily; the girl; wit is found; get ready; rigid line; setting out; this all; the great are good; wits mean much; lily I am; I agree much; I am little as; would you with me; get between; not go with; would never will; alcohol; am yield with; along with you; ramble on.

Thematic classification of a second protocol:

I. References to the first person.

I am distressed; I was very hard to understand; I would live a peaceful life; I beg thee; I will be just; I was frightened; I wish to understand; I have got; Live I ever; I will get; Now I am going to write; I have to understand.

II. References to another person.

The bodyguard; This boy studies; I beg thee; He wished to continue; Not with your intelligence; But will you be here to see; You be it; Is friend.

III. Special themes.

A. Books are very good; Which bright story; Not every story is disappointing; Now I am going to write.

B. No light shines here; Light is greater than; enlighten; evening is over.

C. Medicine and science; peritonitis; bodily strength.

D. Fight; The war is over; This war is for science.

E. Just for this thirst; To be dry at everything.

F. Life is strength; Live I ever; I would live a peaceful life; Living is in the skin and mind.

G. Each gift; This gift; The gift is to understand; No gift is; Gifts are knowledge.

IV. Responses not belonging to recurrent themes.

No right here; Freedom there; Not this disappointment; That bad; Everything is joy; Everything is interesting; This boy studies; Great things; Not so silly; No fail; Polite at; Efficiency; There spring is; Early dishwasher; Thing place; Theatre; Ever bet; While not; Stilled; Wasn't it; Five down; No longer wall; Jewels; After this; That is going; They had underwritten; No lag; Don't be befuddled; It was Macaulay's; Wishing; Wills.

Several more elaborate methods of classification have been suggested, but the above grouping of responses will be sufficient to illustrate the tendency of themes to recur in a protocol.

SUMMARY

A visual form of the verbal summator has proved effective in evoking latent responses by summation with incipient responses to printed speech patterns. Data from this experiment show a close resemblance to standard English with respect to distribution of word-percentages. To illustrate the type of response obtained, complete records for two subjects are reported.

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